Section 27
Reclamation Drilling Standards

27.1 Scope

This section establishes specific safety requirements for earth and rock drilling operations for all Bureau of Reclamation (Reclamation) owned, controlled, or occupied facilities and construction sites. This section does not apply to drilling holes for blasting operations. Reclamation Safety and Health Standard (RSHS) Section 24, *Blasting Operations*, provides drilling requirements for blasting operations.

27.2 Responsibilities

27.2.1 First-Line Supervisors

27.2.1.1 Shall ensure employees assigned to drill teams receive training required by this section.

27.2.2 Onsite Job Leads

27.2.2.1 Shall ensure employees conduct all site preparations and drilling operations as outlined by the drill plan and this section.

27.2.2.2 Shall ensure employees cease all drill operations when weather conditions, as outlined in this section, present an unsafe work environment.

27.2.3 Regional Geologists and Drill Project Leads

27.2.3.1 Shall develop a drill plan for all assigned drill projects.

27.2.4 Employees

27.2.4.1 Shall complete training required by this section.

27.2.4.2 Shall conduct all site preparations and drilling operations as outlined by the drill plan and this section.

27.3 Training Requirements

All drill team members shall complete one-on-one, on-the-job training from an experienced drill team member and shall demonstrate competence to an experienced drill team member before working independently in an assigned role.

27.4 Pre-job Briefing and Planning Requirements

27.4.1 Drill Plan

The regional geologists or drill project leads shall develop a drill plan including the following information:

- overview of the drilling project,
- site survey,
- site preparations,
- site layout and operations,
- job hazard analysis for each operation,
- emergency response plans,
- fire prevention and protection plans,
- required drilling equipment,
- required drill team members, and
- site closeout and remediation.

27.5 Hazardous Environmental Conditions (Weather/Other)

27.5.1 Lightning

The on-site job lead shall stop all drilling operations when lightning is detected within 5 miles of the drill site.

27.5.2 Wind

The on-site job lead shall stop all drilling operations when the wind speed at the drill site exceeds the manufacturer's recommendations or presents an unsafe work environment.

27.6 Personal Protective Equipment (PPE)

While at the drill site, first-line supervisors and/or onsite job leads shall provide all drill team members and visitors personal protective equipment for protection from potential hazards. This may include wearing safety glasses, hard hats, hard toe safety shoes, long pants, shirts with minimum 4-inch sleeves, hearing protection, and gloves meeting the requirements of RSHS Section 8, *Personal Protective Equipment*. The job hazard analysis shall identify required personal protective equipment.

27.7 Safe Practices

27.7.1 Site Survey

27.7.1.1 Access Routes. The site survey shall identify existing or planned routes that allow for the safe and reliable access of equipment and personnel.

27.7.1.2 Terrain. The site survey shall propose a work site that provides or that employees may modify to provide a safe location for equipment and personnel.

27.7.1.3 Underground Utilities. The site survey shall identify underground utilities at the proposed work site.

27.7.1.4 Aboveground Utilities. The site survey shall identify aboveground utilities at the proposed work site.

27.7.2 Site Preparation

27.7.2.1 Underground Utilities. Onsite job leads shall ensure the applicable locating company locates and marks underground utilities prior to the start of on-site work.

27.7.2.2 Aboveground Utilities. Employees must locate aboveground utilities and mark approach boundaries, as necessary, prior to the start of on-site work.

27.7.2.3 Clearing. Employees must clear the work site to provide a safe location for equipment, supplies, and personnel.

27.7.2.4 Protecting. Employees must configure the work site to protect it from collected water, flooding, ground caving, dirt slides, falling rocks, vegetation fires, falling trees, and other recognized hazards.

27.7.2.5 Drainage. Employees must configure the work site with drainage and mud pits to safely direct and collect drill operation water and mud.

27.7.2.6 Excavations. All excavation operations shall meet the requirements of RSHS Section 22, *Excavation Operations*.

27.7.3 Working Platforms

27.7.3.1 General. The work platform shall meet the requirements of RSHS 13, *Walking and Working Surfaces*.

27.7.3.2 Stabilize. Employees must site and construct drill platforms on stable soil and on supported foundations, timbering, or outriggers as needed.

27.7.3.3 Lighting. The drill platform manufacturer must equip drill platforms used during nighttime hours or in areas without natural light with a lighting system that provides all working surfaces with a minimum of 10 lumens (i.e., foot candles) illumination.

27.7.3.4 Electrical. The drill platform manufacturer must equip drill platforms, where required, with electrical systems installed and maintained per the requirements of National Fire Protection Association (NFPA) 70, *National Electrical Code*.

27.7.4 Drill Rigs

27.7.4.1 Operator. Only authorized personnel trained in the operation of the specific drill rig may operate that drill rig.

27.7.4.2 Operator-in-Training. Employees completing on-the-job training must operate equipment under the direct supervision of an experienced drill team member. An experienced drill rig operator must continuously monitor employees that are training to operate the drill rig.

27.7.4.3 Emergency Stop System. The drill platform manufacturer must equip the drill rig with an emergency stop power shutoff safety system arranged so both the rig operator and the drill or auger head operator can activate the system from their workstation.

27.7.4.4 Emergency Stop Labels. The drill platform manufacturer must label the emergency stop power shutoff safety system and employees must ensure the system is identifiable in all operating conditions indicating the function and method of operation.

27.7.4.5 Emergency Stop Testing. Employees must function-test the emergency stop power shutoff safety system at the start of each shift.

27.7.4.6 Warning Signs. Employees or the on-site job lead must equip the drill rig with warning signs containing the following wording in full view of the operators:

- All personnel must be clear before starting machine.
- Stop the auger prior to cleaning.
- Stop engine when repairing, lubricating, or refueling.
- Do not wear loose fitting clothing, jewelry, or extended cuff gloves.

27.7.4.7 Unattended Drill Hole. Employees must adequately cover and protect unattended drill holes to prevent people, animals, or debris from entering.

27.7.4.8 Inspection. Employees must inspect the drill rig for the manufacturer's recommended safe operating conditions at the start of each shift.

27.7.4.9 Control Levers. The drill platform manufacturer must design control levers, where practicable, to return to neutral when releasing the control levers.

27.7.4.10 Control Lever Labels. The drill platform manufacturer must clearly label the control levers indicating the function and direction of operation.

27.7.4.11 Refueling. Employees must only conduct refueling when the drill rig and internal combustion engines are shut down.

27.7.4.12 Hoisting Equipment. The drill rig hoisting equipment shall meet the requirements of RSHS Section 19, *Hoisting and Pile Driving Equipment*.

27.7.4.13 Machine Guarding. The drill rig shall be equipped with machine guarding for all gears, moving parts, and power tools as required by RSHS Section 17, *Hand Tools, Power Tools, Pressure Vessels, Compressors, and Welding* and 29 Code of Federal Regulations (CFR) 1910 Subpart O, *Machinery and Machine Guarding*.

27.7.4.14 Exhaust Systems. The drill platform manufacturer must equip the drill rig with spark arresters on all internal combustion engine exhaust systems.

27.7.5 Truck-Mounted Drills

27.7.5.1 Work Platform. The truck-mounted drill work platform shall meet the requirements of RSHS Section 13.

27.7.5.2 Vehicle Operations. The truck-mounted drill vehicle operations shall follow all the requirements of RSHS Section 39, *Motor Vehicle Safety*.

27.7.5.3 Securing Equipment. Employees must secure the truck-mounted drill equipment and supplies in the transport position prior to moving the truck.

27.7.5.4 Backing Alarm. The truck manufacturer must equip the truck-mounted drill vehicle with an automatic backup alarm.

27.7.5.5 Truck Backing. The truck-mounted drill vehicle operator must inspect the area behind the truck for hazards, objects, and personnel before moving the truck backwards.

27.7.5.6 Backing Spotter. The truck-mounted drill vehicle operator must use a spotter when moving the truck backwards.

27.7.6 Skid-Mounted Drill Units

27.7.6.1 Towing. Employees will select and operate machinery used to tow skid-mounted drill units per the requirements of RSHS Section 20, *Mobile and Stationary Mechanized Equipment*.

27.7.6.2 Hoisting. Employees will select and operate the hoisting equipment used to move skid-mounted drill units per the requirements of RSHS Section 19.

27.7.6.3 Platforms and Access. The skid-mounted drill unit manufacturer must equip the drill unit with work platforms and personal access methods meeting the requirements of RSHS Section 13.

27.7.6.4 Securing/Anchors. Employees must secure the skid-mounted drill unit in-place as required by manufacturer's operating instructions and recommendations.

27.7.7 Underground Drilling Operations

Underground drilling operations shall meet the requirements of RSHS Section 23, *Tunnel and Shaft Construction,* and 29 CFR 1926, Subpart S, *Underground Construction, Caissons, Cofferdams, and Compressed Air*.

27.8 Definitions in Appendix K and References in Appendix L